

Progress in microbial diversity and population structure studies in the Río Tinto

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Our project focuses on the Río Tinto, a 100-km long, acidic, heavy metal laden river running through the world's largest pyritic belt in southwestern Spain. Environments like the Río Tinto provide an excellent terrestrial model for Mars because there is growing evidence that certain mineralogical and sedimentary features on Mars could have only formed in an acidic environment. Another important link to Mars is the presence and forms of iron occurring in both environments.

Despite the extreme conditions found in the Tinto, a thriving microbial community exists. By combining diversity information with physical and chemical data, we can explore how geochemical forces shape community structure in the river. Using multivariate statistical methods, we hope to reveal relationships between physico-chemical correlations and distributions of prokaryotes and eukaryotes in the Río Tinto.

To date, we have carried out two full sampling efforts corresponding to the dry and wet season extremes. We are currently analyzing the results of both rRNA gene clone library sequences (bacterial, archaeal and eukaryal) and SARST-V6 (Serial Analysis of Ribosomal Sequence Tags of the V6 hypervariable region – a region spanning from 52-152 base pairs in length in known bacteria) experiments on samples collected during October of 2002. Over seventy unique clones from full-length gene clone libraries were completely sequenced and used in a three-domain phylogenetic analysis consisting of 300 total taxa, and thousands of SARST tags have been recovered to date. These data along with our geochemical data will be summarized in our presentation.